processed through the CPU, because an adjustment must be made, and a new PWM signal generated. This takes too long. Providing it via dedicated hardware has additional costs and complexity, and the modified pulse train to the lamp is . In any case, a fault condition of any cause or duration triggers the fault response and affects performance. Where such fault condition is only transient or temporary, and is not indicative of any enduring and potentially dangerous problem, there is no reason to modify the performance of the lamp, and thus decrease the service provided by the lighting system.

As a result of the foregoing discussion, clearly a significant need exists in the art for an overload protection circuit for an electric lamp and ballast which can provide both the programmable flexibility of a software solution with the immediacy and speed that can only be currently delivered by a hardwired overload protection circuit. There is further a need to distinguish transient fault conditions from enduring ones that mandate modifying the waveform delivered to the load. Such distinction would protect the circuit and its components, yet at the same time not needlessly modify the driving signal to the load until it can be determined that the fault condition is in fact real.

SUMMARY OF THE INVENTION

The above-described shortfalls of the prior art are overcome in accordance with the teachings of the present invention which relates to an apparatus and method for providing overload protection for a circuit by means of a hybrid software and hardware solution. In a preferred embodiment, this circuit is used in a digital ballast controlling electric lighting using a half-bridge power converter, such as is commonly used in the control and operation of gas discharge lamps. The invention can easily be expanded to other power conversion circuits driving a wide variety of loads.

In a preferred embodiment, upon the sensing of a fault condition the circuit reacts immediately to temporarily block all driving signals from reaching the load. At the same time, the signals themselves remain intact, and are neither modified nor terminated until it can be confirmed that the fault is a "real" one.

Effectively, the driving pulse trains are overridden, or blocked, via hardware logic gates during initial sensing of overload conditions for a user defined short time interval. If such conditions persist beyond a user defined number of such blockings, the pulse trains can then be modified, attenuated, or terminated, as defined and set by the user, via software.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 shows an exemplary DC/AC power converter commonly in use;

Fig. 2 depicts the driving voltages, output voltage, and inductor current for the exemplary circuit of Figure 1; and

Fig. 3 depicts an exemplary blocking signal and the internal and external driving voltages according to the method of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

For purposes of explanation we refer herein to high voltage, high-frequency switches. These switches are well known in the art for driving gas discharge lamps. They operate by means of generating an alternating current waveform that is used to drive the lamp during steady state operation. The actual driving pulse in these ballasts, whose duty cycle and frequency affect the intensity or luminance of the lamp, is generated by either a single pulse generator, a half-bridge, power converter, or a full bridge power converter circuit.

In the latter two cases (and theoretically, there could be circuits with an arbitrary number of